

The Collaborative Crop Research Program

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Co-developing agro-ecological options for Food-Energy -Environment nexus in watersheds of eastern Uganda



Fig. 1: Farmers in Namabya sub county cultivate close to river banks and pollute water courses. Inappropriate soil and water management practices are widespread, leading to soil and water degradation, and hence poverty

Project Summary

Severe deforestation and poor farming practices exacerbate soil and water degradation in the fragile highland ecosystems of Mt. Elgon, Uganda, ultimately leading to severe poverty and water-borne diseases. Limited success in addressing this challenge is related to the plot-level scale at which interventions are implemented. This project aims to integrate the multi-stakeholder Innovation Platform (IP) approach, market-based mechanisms and legislative instruments to foster collective action in developing and implementing agro-ecological options at watershed level. The goal is to achieve improved access to sustainable food, energy and allied environmental benefits. Three micro-catchments in Manfwa and Namisindwa districts will be used to mobilize stakeholder participation for collective action. Agro-ecological land and water management interventions such as soil erosion control, riverbank stabilization and water source protection will be implemented. The use of incentives, disincentives and other economic and regulatory instruments to foster sustainability of the interventions will be explored. This project will generate empirical evidence of the potential of co-implementing agro-ecological interventions on sustainability of socio-economic benefits.

Background

The eastern highlands of Uganda are prone to landslides, due to geological formations and steep slopes. Severe deforestation and poor farming practices exacerbate soil and water degradation in this area, ultimately leading to poverty. Several partners have, for long, promoted land management practices but adoption levels remain low. This is potentially attributed to the plot-level non-participatory approaches used. Also, the limited misunderstanding that sustainable watersheds can be achieved simply by enforcing regulations, limits realization of land management plans.

The interrelatedness of food, energy and environmental degradation is both a dilemma and an opportunity. A dilemma because efforts to increase access to food can lead to degradation of soil, water, biodiversity and other environmental benefits. Thinking from a nexus point of view give an impetus to investments, because investing in a project that involves all these three sectors at the same time has a higher return than one that considers them individually: the interconnection between the three sectors makes them act on each other with a multiplier effect (IUCN, 2019). Most nexus studies do not enable monitoring of livelihood outcomes from an environmental perspective

(See (Hoff, 2011; Giampietro et al., 2013; Howells et al., 2013; FAO, 2014). Capacities and bottom-up approaches need to be built and local solutions to regional nexus problems sought. Effective watershed management should involve community participation schemes, public-private partnerships and private investment structures (UNEP, 2015). Participation at household level is driven by the immediate benefits from food and energy products (Fig. 2). Service benefits such as flood control, water purification, and soil erosion control are additional direct benefits that motivates downstream populations. Conditions that favour the use of



Fig. 2: Farmers participating in collective action to establish stones lines for soil erosion control in Bugobero, micro-catchment. In eastern Uganda. Collective action at watershed scale is a cornerstone for sustainable land management in mountainous agro-ecosystems.

incentives and other market-based mechanisms to promote adoption of sustainable land-use and watershed management practices needs to be explored.

Applying a combination of community-based landscape-level approaches with market-based methods can strengthen the participation of local communities and the private sector, and reverse ecosystem degradation (Reed et al., 2016). Examples of such market-based mechanisms have been found to be effective in Kenya and Tanzania (Lopa and Mwanyoka, 2010). This project will explore interventions such as (i) including soil and water conservation practices as part of certification requirements for eco-labelled export coffee from the Mt. Elgon area, (ii) downstream commercial water resource users and associations paying upstream small-scale land managers for soil and water conservation and agroforestry.

Some studies have shown that adaptive strategies developed at national scales might not be locally appropriate, particularly when their adoption is complicated by the differences in local ecosystems and socio-cultural relations (FAO, 2013). Thus, approaches such as Innovation Platforms (IPs) are being recommended (Bryan et al., 2009) because they encourage closer relations with local actors, expose households to more knowledge and resources and strengthen their ability to adapt (Chaudhury et al., 2017). The IP process can be used to address barriers to landscape-level technology uptake in different socio-cultural environments. This project intends to use the IPs as an entry point into co-development agro-ecological interventions at watershed level market-based mechanisms.

Objectives

The goal of the project is to achieve an agroecosystem that sustainably supplies food, energy and clean and safe water. The specific objectives of the study are: (1) Strengthening capacity of stakeholders for collective action in agro-ecological watershed management; (2) Promote agro-ecological land and water management interventions that reduce soil erosion, maintain water quality and improve water access; (3) Support participatory development and institutionalization of relevant regulation to foster adoption of agro-ecological watershed management, (4) Evaluate the potential of market-based mechanisms for agro-ecological management in the selected micro-catchments in the Mt. Elgon agroecosystems of Uganda.

Study area

The target micro-catchments fall within the Upper Manafwa sub-catchment (sub-catchment No. M2) of the Mpologoma catchment as defined by the Ministry of Water an Environment (MoWE, 2019) (Fig. 3). The catchment suffers mainly from pollution caused by agricultural run-off. This is consistent with land use in the catchment. Biological Oxygen Demand (BOD)

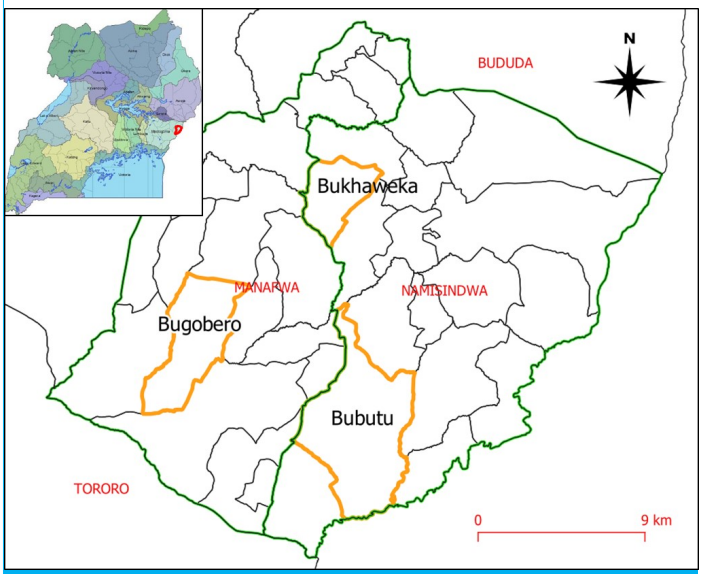

Fig. 3: Project sites in Manafwa and Namisindwa district s

loads of between 15% and 18%, are partly caused by the lack and inadequacy of sanitation facilities the area. In the absence of significant rainfall events, especially during the dry seasons, little pollution is released from run-off.

Approach

The overall approach of the project is to organize watershed actors in a multi-stakeholder Innovation Platform (IP) in order to collectively articulate the critical challenge and identify appropriate solutions to the local environment while observing agro-ecological principles (Diversity; synergies; efficiency; resilience; recycling; co-creation and sharing-of knowledge). As most water sources are surface flowing and the main water quality problem is turbidity, promotion of good land management practices is a good way to address the problem. Secondly, quantitative monitoring of surface water is also necessary. The number of water quality monitoring stations need to be expanded and additional parameters measured. Adequate water treatment plants for drinking water should be established to measure progress towards achieving recommended standards of drinking water quality. To sustain the efforts, economic and legislative instruments will be integrated as part of the implementation process. A multistakeholder innovation platform will be established in two of the micro-catchment (Bukhaweka/ Namabya and Bukhausi/Buabwala). In the Third micro-catchment, an old platform will be revived to continue with previous actions of soil erosion control in Bugobero micro-catchment. A baseline survey will be conducted at the start of the project to better understand the local situation and use this information to inform subsequent actions but will in future e used for impact assessment.

Project duration

The project is expected to last two years from June 1st 2021 to May 31st 2023. Table 1 highlights the key activities and timelines within which they have to be accomplished.

Expected project outputs

i) A key result from the project is a catchment management plan for each of the three participating micro-catchments. These plans will incorporate some of the interventions planned by the district local governments and the Catchment Management plan for sub-catchment No. M2 of the Mpologoma catchment.

ii) This project will contribute at least 20% of the targeted 700 km of contour hedge rows in Bukhaweka sub county in the Financial year 2022/2023. The project will also contribute 50% of the 7.0 km of the stabilization of the banks of river Kufu in Bukhaweka

Table 1: Summary of activities and timelines for the project

Planned activities under this objective	Methodology / learning / comments	Who, when, & where:
Objective 1: Strengthening capacity of stakeholder for collective action in agroecological watershed management		
Inception meeting with key stakeholders in the study watershed	One-day meeting	NaFORRI, McKnight collaborators, Local governments, farmers/farmer representatives, August 2021 in Namisindwa, eastern Uganda
Building a knowledge base to inform planning and management	Household surveys, Key Informant Interviews, Participatory Rural Appraisal; Review of literature	NaFORRI, August 2021, Manafwa and Namisindwa catchments, eastern Uganda
Establishing and strengthening Innovation Platforms as part of the framework for catchment planning	Seminars/Workshops to train key watershed actors, including smallholder farmers NGOs and local governments in the uplands and private utility companies and water users downstream to participate in watershed management planning and management processes	All relevant stakeholder from Research, Policy, extension, private sector, and farmers, September 2021-September 2022 in Manafwa and Namisindwa, eastern Uganda
Establish demonstration sites of at least three agroecological watershed management interventions	Farmer Field Schools for each of the interventions (Riverbank stabilization, soil erosion control, water source protection)	NaFORRI, Farmers, extension staff; From January 2022 - April 2023, in Bugobero
Objective 2: Co-develop locally adaptable criteria and indicators for sustainable agroecological watershed management		
Identify and mobilize specific groups to participate in a selected economic instrument	Consultative meetings with land and water use groups	NaFORRI, ICRAF, Local government, farmers, September 2021-January 2022, Manafwa and Namisindwa,
Ecosystem service measurement and valuation	Consultative meetings with user groups	NaFORRI, ICRAF, Local government, farmers, September 2021-January 2022, Manafwa and Namisindwa,
Drafting rules of engagement and strategic plan among actors	Stakeholder meetings	NaFORRI, ICRAF, Local government, farmers, September 2021-January 2022, in Manafwa and Namisindwa,
Objective 3: Support local governments to develop relevant regulation to foster adoption of agroecological watershed management		
Mobilizing relevant stakeholders to identify necessary regulatory actions at watershed level	Consultative meetings	NARO, Local government, Farmer leaders, Private Sector, Manafwa and Namisindwa, January – June 2022
Drafting rules and regulation to address the challenges in compliance	Stakeholder meetings to identify issues and review draft regulations	NARO, Local government, Farmer leaders, Private Sector, Manafwa and Namisindwa, June-December June 2022
Develop and disseminate a communication strategy to sensitization stakeholders regulations	Stakeholder meetings on the roles and responsibilities of different actors in the compliance with developed rules and	NARO, Local government, Farmer leaders, Private Sector, Manafwa and Namisindwa, January – June 2023

sub county using Bamboo. At least 1,500 farmers and land mangers will be trained on various soil and water conservation practices. A basket of suitable, locally adaptable agro-ecological interventions for food and nutrition security and land management identified

iii) At least 600 farmers and 15 extension staff trained on agro-ecological and watershed management principles.

iv) At least 12 local nursery operators will be trained on raising seedlings for soil and water conservation and food.

v) A set of criteria and indicators on the performance of successful agro-ecological watershed management developed

vi) A set of regulations will be developed for each of the sub counties to ensure effective compliance with collectively agreed measures to control and water degradation.

vii) One Masters student in environmental economics will be supported to evaluate potential of economic instruments for watershed management

Desired outcomes

It is expected that once the project is implemented successfully;

i) Farmers will appreciate the significance of working together at catchment level to reduce soil and water management activities in the catchment

ii) Local governments are able to integrate catchments activities into their local government plans and allocate resources for watershed management activities

iii) Private sector is willing to invest in schemes to contribute to reducing soil erosion and water pollution in the catchment

iv) Nurseries are able to provide adequate and timely supply of priority seedlings for farmers to plant.

v) Local governments will also facilitate the process of formulating regulations to ensure compliance with community-level implementation of agro-ecological practices.

Alignment with National and international priorities

It is expected that adoption of agroecological interventions will lead to efficient land management, reduced water pollution, increased crop yields, and incomes for small-holder farmers in the highlands. This project will contribute directly to Uganda's Nation Development Plan III (NDP III), which highlights agroforestry as one of the interventions to achieve strategic objective 2 of "Increase forest, tree and wetland coverage and restore and protect hilly and mountainous areas and rangelands. Results from this project will also contribute to the National Adaptation Plan of Action for the Agricultural Sector in Uganda by promoting agro-ecological practices, which are part of the wider climate-smart agriculture approach. The project also supports the Integrated Water Resource Management (IWRM) approach as stipulated in the National Water Policy for Uganda. These localised, small-scale solutions may have impacts for the entire river Manafwa basin. Furthermore, the UN SDG 15 on halting and reversing land degradation, and SDG 2 with respect to ensuring availability of food through land productivity enhancement are supported by the actions of this project.

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